THE PHYLOGENY AND RECLASSIFICATION OF THE NORTH AMERICAN GENERA OF PHLAEOTHRIPIDAE (THYSANOPTERA: TUBULIFERA)

BY

LEWIS JUDSON STANNARD, JR.

B.S., Pennsylvania State College, 1946
M.S., University of Illinois, 1947

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN ENTOMOLOGY
IN THE GRADUATE COLLEGE OF THE
UNIVERSITY OF ILLINOIS, 1952

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ACKNOWLEDGEMENTS

This revision was based on a study of more than 12,000 slides representing about 400 species of thrips. Many of these specimens were made available to me by the staff of the Illinois Natural History Survey. Still others were exchanged or lent or presented as gifts by most of the thysanopterists of all countries and by interested zoologists and by officers of several North American museums. To all of these persons, whose names would fill several pages, I extend my grateful appreciation.

In particular, I am indebted to my advisor, Dr. H. H. Ross, for directing me into the field of insect evolution. His own works on insect phylogeny, his many discussions and seminars, his advice, and his enthusiasm for the subject were the stimulants that encouraged me as I undertook the task to gain an understanding of the origins, distribution, and dynamics of the North American Thysanoptera.

To the Society of the Sigma Xi I express my obligations for the Grant-in-Aid given me to help finance a collecting trip to the Yucatan Peninsula in the summer of 1951. Much of the information of the Neotropical fauna recorded herein was derived from a study of the specimens secured at that time.

The carefully made mounts of most of the thousands of thrips examined transformed these minute insects into easily studied specimens. I am most indebted to Mrs. Marie Fischer and Mr. Thomas E. Moore for their skillful help in the preparation of these slides, and for many other favors.

THE PHYLOGENY AND RECLASSIFICATION OF THE NORTH AMERICAN GENERA OF PHLAEOTHRIPIDAE (THYSANOPTERA: TUBULIFERA)

The insect order Thysanoptera or thrips is divided into two suborders, the Terebrantia whose species bear a saw-like ovipositor in the female sex and the Tubulifera whose species always have the last abdominal segment modified into a tube and whose species lack an ovipositor in the female sex. This study deals with the suborder Tubulifera and treats those genera found from the Arctic circle to Panama.

Morphologically the suborder Tubulifera is composed of but one family, the Phlaeothripidae. In the past most of the diagnoses of the genera of this family were based on the shape of the body outline. Previous classifications that employed these types of diagnoses proved difficult and unsatisfactory from a practical as well as from a phylogenetic standpoint. For this revision other characteristics were introduced such as the form of the maxillary stylets, the sternites of the thorax, and the form of the notal shield on abdominal segment I. Use of these features provided valuable clues as to the relationships of the Phlaeothripidae and provided points for the positive recognition of the groups.

In the reorganization of the older classifications several important changes were made. All those genera with thick band-like maxillary stylets were placed together. Thus *Cryptothrips* and *Allothrips* were removed from placement near *Phlaeothrips* to placement near *Elaphrothrips*. Various genera related to *Phlaeothrips* were made subgenera of this latter genus, principally because each one of these subgroups can be linked by species with intermediate characteristics. The genus *Phlaeothrips* itself was redefined and, for the first time since 1845, was based on *Thrips ulmi* Fabricius, the proper type species.

Sixty-six genera and subgenera were included in the

several keys and tables of differences. Five genera were omitted due to the lack of available material in North American museums. Most of the genera and subgenera keyed were individually diagnosed. Each group was redefined and a list of the synonymy, much of it new, was given. Usually a brief account of their relationships, habits, and distribution was included. In a few instances keys to the known species were constructed. Nine new species were described, one in *Neurothrips,* one in *Amphibolothrips,* one in *Metriothrips,* one in *Phlaeothrips* subgenus *Acanthothrips,* four in *Eurythrips* subgenus *Orthothrips,* and one in a new genus.

A comparison of the modern genera indicates that the Phlaeothripidae may have arisen from a *Heliothrips*-like ancestor of the Terebrantia. Possibly the Phlaeothripidae arose from a tubed Heliothripini and then lost the saw-like ovipositor. Later the Phlaeothripidae prototype further evolved by the modification of the mouth parts and by modification of the thoracic sterna.

Once established as a group the Phlaeothripidae radiated into a number of phyletic lines. These lines were named for the most spectacular or most recently evolved genus.

The first line to emerge may have been the *Williamsiella* line. Genera of this group have short maxillary stylets much like the condition found in the generalized Terebrantia.

Perhaps the same ancestor that produced the *Williamsiella* line was also the forerunner of the other major lines. From that ancestor a second evolutionary burst came about to give rise, on the one hand, to the *Idolothrips* line and, on the other hand, to the various lines related to *Phlaeothrips.*

The *Idolothrips* line developed thick, band-like maxillary stylets. The other lines retained thin maxillary stylets and many of them, unlike *Idolothrips,* developed sternal glandular areas in the male sex.

At the present time the lines related to *Phlaeothrips* are the dominant groups. Most likely the earliest of these to

diverge from the main stem were the *Trybomia* and *Leeuwenia* lines. Neither of them developed long stylets and both retained praepectal plates in the neck region. Most species of the more recently evolved lines in the *Phlaeothrips*-like group lost the praepectal plates and the maxillary stylets often became elongated. The *Gigantothrips* line may have arisen next in sequence. Some of its genera became gall makers. Subsequently the *Tropothrips* line may have evolved to produce genera with extremely long stylets and with cheek pouches. The warty headed, apterous *Amphibolothrips* line diverged slightly later. Finally the warty cheeked *Neurothrips* line evolved as one of the most advanced groups in the scale of modern thrips evolution.

Whereas the more primitive Terebrantia are living leaf and flower feeders, the Tubulifera or Phlaeothripidae are mostly fungus spore feeders. In their evolution the Phaeothripidae exploited the many niches in which fungus spores abound. For the most part their evolution seemingly took place in the warm temperate and tropical regions of the world.

VITA

Lewis Judson Stannard, junior, was born on April 15, 1918 in Philadelphia, Pennsylvania. Upon graduating from the public High School in Newtown, Pennsylvania, he enlisted in the Army of the United States and served two years in the Panama Canal Zone. In 1938 he enrolled in the Pennsylvania State College to begin his undergraduate studies. At the end of his Junior year, he reentered the Armed Forces to serve as a Bombsight Maintenance Officer in the American and Mediterranean Theaters during the period from 1941 to 1945. Thereafter he resumed his studies at the Pennsylvania State College and received the degree of Bachelor of Science in 1946. The next year he received the degree of Master of Science from the University of Illinois. Since 1947 he has been an Assistant Taxonomist in the Illinois State Natural History Survey. He is a member of the Society of the Sigma Xi, a fellow of the Entomological Society of America, and a member of seven other scientific societies. He is the author of "A new species of *Tenthredo* from the Appalachians", "The Nearctic species of the genus *Periclista*", "A new genus of Phalaeothripidae from Mexico", "The second species of *Psectrothrips*", "A new *Sericothrips* from Illinois", "Phylogenetic studies of *Franklinothrips*", "Distribution of *Trachythrips watsoni* in Illinois", "A new Australian Phlaeothripidae", and "Peanut-winged thrips".